

Montana Comprehensive Assessment System (MontCAS CRT)

GRADE 8
COMMON RELEASED ITEMS
SPRING 2014



opi.mt.gov

Montana
Office of Public Instruction
Denise Juneau, State Superintendent

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Science Directions

This Science test contains three test sessions. Mark or write your answers in the Answer Booklet. Use a pencil to mark or write your answers.

This test includes two types of questions: multiple-choice and constructed-response questions.

For the multiple-choice questions, you will be given four answer choices—A, B, C, and D. You are to choose the correct answer from the four choices. Each question has only one answer. After you have chosen the correct answer to a question, find the question number in your Answer Booklet and completely fill in the circle for the answer you chose. Be sure the question number in the Answer Booklet matches the question number in the Test Booklet. The example below shows how to completely fill in the circle.

CORRECT MARK	INCORRECT MARKS
<input checked="" type="radio"/>	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>

If you decide to change your answer to a question, erase the wrong mark completely before filling in the circle of the new answer. Be sure you have only one answer marked for each question. **If two circles are bubbled in for the same question, that question will be scored as incorrect.**

If you are having difficulty answering a question, skip the question and come back to it later. Make sure you skip the circle for the question in your Answer Booklet.

For the other types of questions in the Test Booklet, you will be asked to write your answers in the box provided. Read the question carefully. If a question asks you to explain your answer or to show your work, be sure to do so.

You may make notes or use highlighters in your Test Booklet, but you must bubble or write your final answers in your Answer Booklet. **Do not make any stray or unnecessary marks in your Answer Booklet.**

Let's work through a sample question together to be sure you understand the directions.

Sample Question

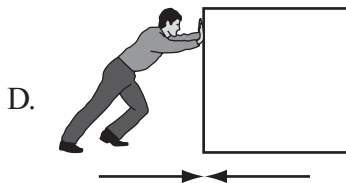
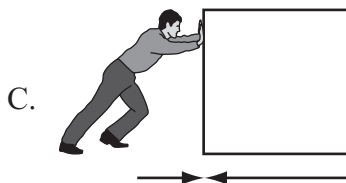
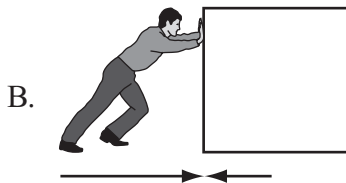
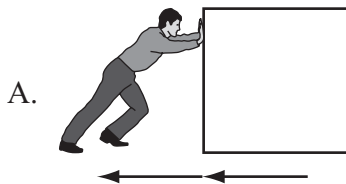
1. What is the state animal of Montana?
 - A. elephant
 - B. grizzly bear
 - C. zebra
 - D. giraffe

Science

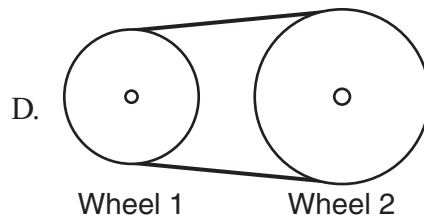
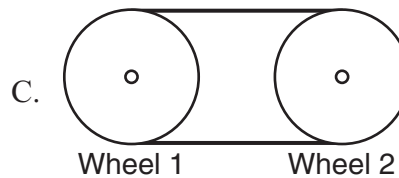
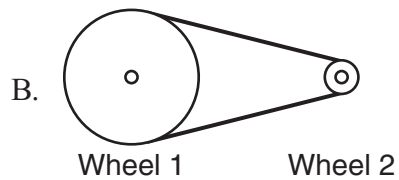
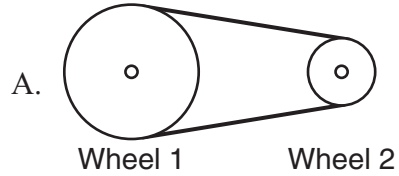
1. A student scratches six different minerals against one another. What property of minerals is the student investigating?

A. color
B. density
C. hardness
D. luster

2. The pictures below show a student pushing a box. Each arrow represents the amount of force and the direction of the force. Which diagram indicates that the student will move the box?

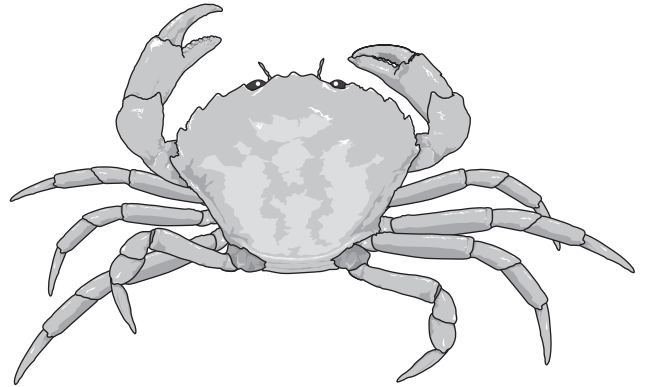


3. In each diagram, Wheel 1 is the same diameter and turns at the same speed. In which diagram will Wheel 2 turn the fastest?



4. A water dikkop is a type of bird that builds its nest on the ground close to where crocodiles lay their eggs. The water dikkop alerts the crocodile when a predator is approaching their nests. The crocodile then chases the predator away. Which type of relationship is demonstrated by the crocodile and the water dikkop?
- A. parasitism, because the crocodile depends on the water dikkop for its survival
 - B. mutualism, because the crocodile and the water dikkop benefit from each other
 - C. competition, because the crocodile and the water dikkop compete for the same resources
 - D. commensalism, because the crocodile benefits from the relationship but the water dikkop does not

5. A student found an organism on the beach like the one in the picture below.



The student uses the following dichotomous key to determine the type of organism she found.

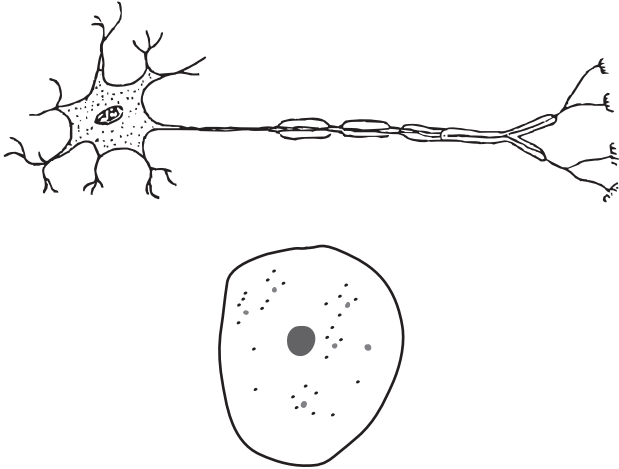
Classification Key

- | | |
|---|--|
| 1. a. spines cover the
body and legs.....king crab | |
| b. no spines.....go to step 2 | |
| 2. a. white-tipped claws.....dungeness crab | |
| b. no color variation
on clawsgo to step 3 | |
| 3. a. three bumps
between eyes green crab | |
| b. no bumps
between eyes harris mud crab | |

What kind of organism did the student find?

- A. king crab
- B. dungeness crab
- C. green crab
- D. harris mud crab

6. The pictures below show two healthy human cells.



Why do the two cells differ in structure?

- A. The cells have lived for different amounts of time.
- B. The cell on the bottom was exposed to water.
- C. The cell on the top has been stretched.
- D. The cells have different functions.

7. A student investigates how photosynthesis is affected by the amount of light a plant receives. She places three samples of the aquatic plant *Elodea* into three test tubes. She then places lamps at different distances from the test tubes. The student counts the number of bubbles produced by the *Elodea* per minute in each trial. The pictures below show her setup for the investigation.

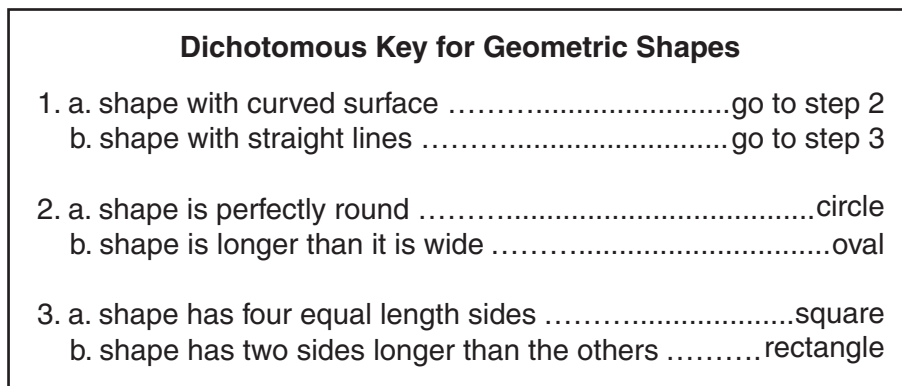


What is the **best** reason for using *Elodea* in this investigation?

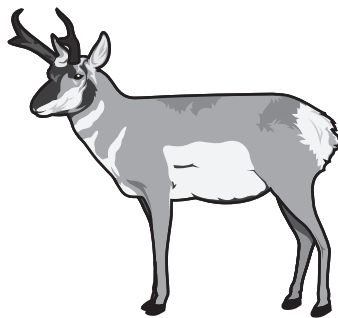
- A. The student can easily fit *Elodea* into the test tubes.
- B. The student can easily obtain a large amount of *Elodea*.
- C. The student can observe *Elodea* bending toward the light source.
- D. The student can determine how much oxygen is given off by *Elodea*.

8. Over the course of its lifetime, a male elephant may grow from 148 kg to 5910 kg. Which process is responsible for the elephant's growth?
- A. muscles stretching
 - B. body cells dividing
 - C. nerve impulses being sent
 - D. the digestive system developing

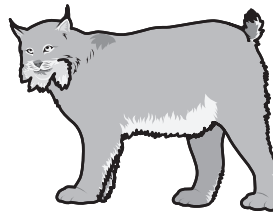
9. The diagram below shows an example of a dichotomous key for geometric shapes.



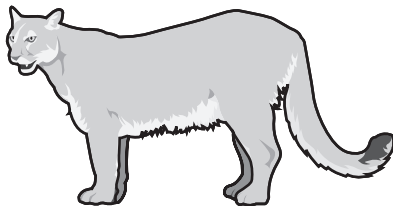
The pictures below show four mammals found in Montana.



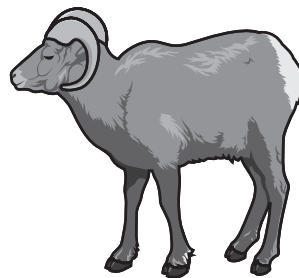
Pronghorn



Canada lynx



Mountain lion



Bighorn sheep

Create a dichotomous key to classify the pronghorn, the Canada lynx, the mountain lion, and the bighorn sheep.

Scoring Guide

Score	Description
4	Response demonstrates a thorough understanding of how to create and use a basic classification scheme to identify plants and animals. Response includes a dichotomous key that classifies the pronghorn, the Canada lynx, the mountain lion, and the bighorn sheep. Response contains no errors or omissions.
3	Response demonstrates a general understanding of how to create and use a basic classification scheme to identify plants and animals. Response contains minor errors or omissions.
2	Response demonstrates a limited understanding of how to create and use a basic classification scheme to identify plants and animals. Response contains major errors or omissions.
1	Response demonstrates a minimal understanding of how to create and use a basic classification scheme to identify plants and animals.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Training Notes

Sample dichotomous keys include the following:

Dichotomous Key for Montana Mammals	
1.	a. horns on animal go to step 2 b. no horns on animal go to step 3
2.	a. short horns that curve inward/up pronghorn b. long horns that curve outward/down bighorn sheep
3.	a. short tail Canada lynx b. long tail mountain lion

Other appropriate characteristics include: behavioral characteristics (e.g., carnivore versus herbivore) and type of feet (hoofs versus paws). The student may use other characteristics as long as the characteristics are correct.

Scoring:

The dichotomous key should be scored holistically. Students who create keys correctly identifying all four animals using correct characteristics should receive full credit.

Example of Score Point 4

Sample 1

1. A. Animal has horns..... go to step 2

B. Animal doesn't have horns..... go to step 3

2. A. Animals horns are curving down..... Bighorn sheep

B. Animals horns are curving up..... pronghorn

3. A. Animal has short tail..... Canada Lynx

B. Animal has long tail..... Mountain Lion

Example of Score Point 4

Sample 2

Dichotomous key for mammals in Montana

① a. a mammal with horns..... go to step 2

b. a mammal with no horns..... go to step 3

② a. has horns that grow upwards..... Pronghorn

b. has horns that circle downwards..... Bighorn Sheep

③ a. mammal has short tail..... Canada Lynx

b. mammal has long tail..... Mountain Lion

Example of Score Point 3

Sample 1

Dichotomous Key for a Pronghorn, Canada Lynx,
Mountain Lion, and Bighorn Sheep

1. a. Animal with horns go to step 2
Animal with a easily noticable tail...go to step 3

2. a. Horns that go upward Pronghorn
Horns that go downward Bighorn Sheep

3. a. Long tail Mountain Lion
Short tail Canada Lynx

Example of Score Point 3

Sample 2

- 1) ^{a)} an animal with horns go to step 2
^{b)} an animal with paws go to step 3

- 2) ^{a)} horns that fork at the tips Pronghorn
^{b)} horns that curve back Bighorn sheep

- 3) ^{a)} animal with a long tail Mountain lion
^{b)} animal with short tail Canada lynx

Example of Score Point 2

Sample 1

1. a. horns that are forked, pronghorn
- b. horns that curve, Bighorn sheep

2. a. ears that are pointed, Canada Lynx
- b. ears that are rounded, Mountain Lion

Example of Score Point 2

Sample 2

Dichotomous Key for Pronghorn, Canada lynx, mountain lion and bighorn Sheep

1. a. mammals with horns Go to step 3
- b. mammals with out horns Go to Step 2

2. a. mammal with short tail Canada lynx
- b. mammal with long tail Mountain lion

3. a. mammal with only horns Bighorn sheep
- b. mammal with horns and ears Pronghorn

Example of Score Point 1

Sample 1

1. a. has horns

B. No horns

2. a. long legs

b. Short legs

3. a. has Short fur

B. has long fur

Example of Score Point 1

Sample 2

1. a.) has horns..... go to step 3

b.) does not have horns..... go to step 2

2.) Short

has paws

3.) has hooves

tall

Example of Score Point 0

Sample 1

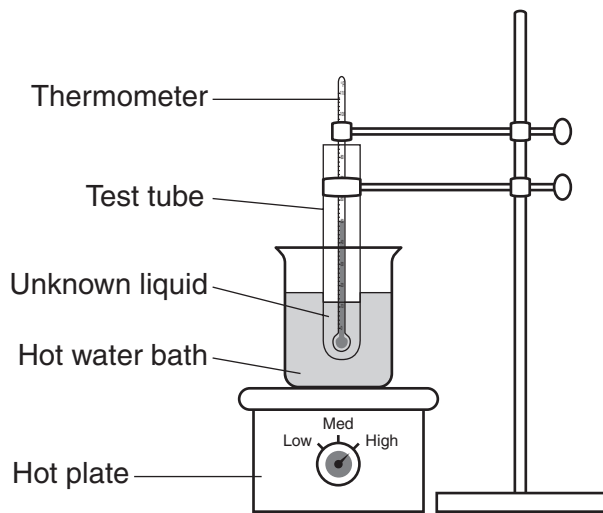
1. mountain lion
2. Canada lynx
3. Pronghorn
4. bighorn sheep.

Example of Score Point 0

Sample 2

1. a) curved horns
b) short
c) muscular
2. a) long tail
b) big cat
c) long muscular body
3. a) long horns
b) long legs
c) long body
4. a) small legs
b) big cat
c) short bulky body

10. The diagram below shows the equipment used to determine a physical property of an unknown liquid.



Which physical property is the equipment measuring?

- A. boiling point
- B. density
- C. electrical conductivity
- D. solubility in water

11. The Punnett square below shows the probable genetic makeup of offspring for a particular trait.

AA	Aa
Aa	aa

What is true about the genetic makeup of the parents?

- A. Both are **Aa**.
- B. Both are **AA**.
- C. Only one is **Aa**.
- D. Only one is **aa**.

12. In some parts of the country, there is concern that too much water is being taken out of aquifers. Which part of the water cycle is **most** responsible for resupplying water to the aquifers?
- A. condensation
 - B. evaporation
 - C. precipitation
 - D. transpiration

13. Which sentence describes a characteristic of all compounds?
- They are made up of gases.
 - They are an evenly mixed solution.
 - They are made up of elements.
 - They are solid at room temperature.

14. Scientific journals have **most likely** focused the greatest amount of attention on which event that occurred in Montana?
- the discovery of gold
 - the Battle of the Little Bighorn
 - the construction of the Utah and Northern Railway
 - the discovery of fossilized dinosaur eggs

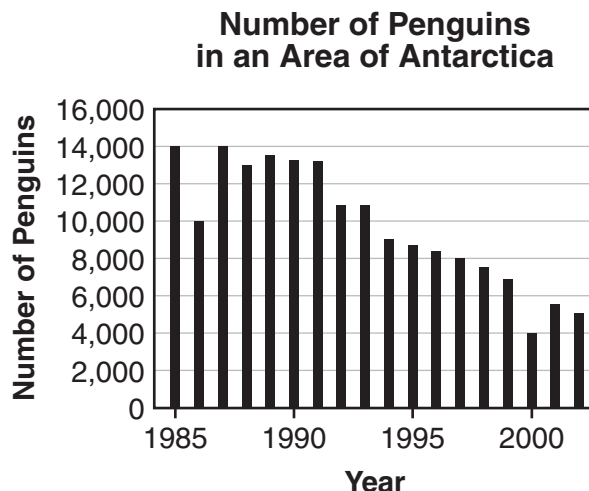
15. The equation for mechanical advantage is shown below.

$\text{Mechanical advantage} = \frac{\text{Resistance force}}{\text{Effort force}}$

A student uses a 10 m rope in a pulley system to apply an effort force of 100 N while lifting a box that has a weight of 400 N. What is the mechanical advantage of the pulley system?

- 0.25
- 4.0
- 10.0
- 40.0

16. From 1985 to 2002, the average temperature for an area of Antarctica increased. The graph below shows the number of penguins that were in the area each year.



One explanation of this data is that the penguins are dying due to the temperature change. Which statement is an alternative explanation?

- The penguins are migrating to areas with colder temperatures.
- The penguins are slowly adapting to live in warm climates.
- The penguins are having more offspring to offset the declining population.
- The penguins are catching more nutritious food.

17. The table below shows the percentages of major gases on four planets.

Approximate Percentages of Major Atmospheric Gases for Four Planets

Planet W		Planet X	
Oxygen (%)	42.0	Hydrogen (%)	86.1
Sodium (%)	29.0	Helium (%)	13.8

Planet Y		Planet Z	
Nitrogen (%)	78.0	Carbon dioxide (%)	96.5
Oxygen (%)	21.0	Nitrogen (%)	3.5

Which planet is Earth?

- A. Planet W
 - B. Planet X
 - C. Planet Y
 - D. Planet Z
18. How does heat energy travel through space from the Sun to a human's skin?
- A. by radiation
 - B. by convection
 - C. by the solar wind
 - D. by conduction

19. Why is granite used in many human-made structures?

- A. Granite is not very dense and is inexpensive to transport.
- B. Granite is heat-absorbant and is used as passive solar material.
- C. Granite is relatively hard and provides a durable surface.
- D. Granite is malleable and easily manufactured into different shapes.

20. Which condition would **most** limit the number of fish in a pond?

- A. low food supply
- B. stable water temperature
- C. low number of predators
- D. absence of water pollution

21. Students in a science class measure the masses and volumes of four different mineral samples to determine the density of each. The results are shown in the table below.

Densities of Four Mineral Samples

Mineral	Mass (g)	Volume (cm ³)	Density (g/cm ³)
Calcite	5.4	2.0	
Galena	8.1	1.1	
Pyrite	15.0	3.0	
Quartz	10.4	3.9	

The formula for density is given below.

$$D = \frac{m}{V}$$

Which mineral has the **highest** density?

- A. calcite
- B. galena
- C. pyrite
- D. quartz

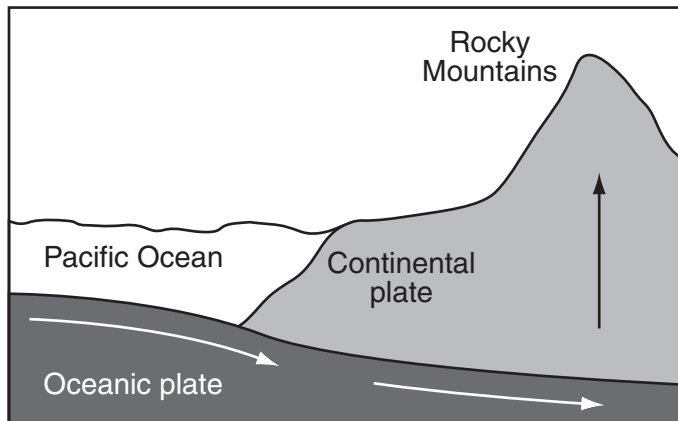
22. A student wants to know if practice helps people improve their reaction times.

The student measures how quickly his 20 classmates catch a meterstick released in front of them. He repeats the procedure with his classmates every day for one week. At the end of the week, he calculates the change in each classmate's reaction time.

How could the student improve his experimental design?

- A. run the tests with fewer of his classmates
- B. add a control group that does not practice
- C. release the meterstick from a different height each day
- D. ask his classmates to collect and report their own data

23. The diagram below shows how the Rocky Mountains formed.



Which geologic process formed the Rocky Mountains?

- A. sudden shifting at a fault line
- B. cooling and solidification of lava
- C. slow movement of a plate across a hot spot
- D. the movement of plates pushing up existing rock

24. A student is doing an experiment to find the solubility of table sugar in water. The student does the experiment at five different temperatures. The results are shown in the table below.

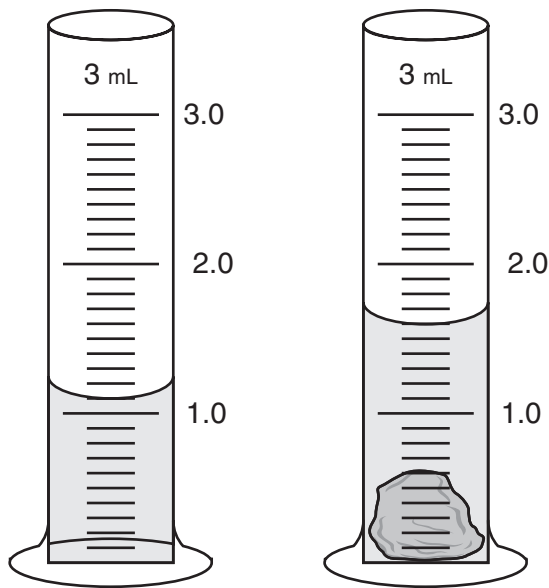
Solubility of Table Sugar in Water

Temperature (°C)	Solubility (g of sugar/ 100 g of water)
0	179
22	206
37	232
60	287
100	487

What is the **best** way to present the solubility pattern seen in the data?

- A. calculate the average solubility
- B. make a line graph of the solubility
- C. create a pie graph of the solubility
- D. record the lowest and highest solubilities

25. The diagram below shows the level of water in a graduated cylinder before and after a rock sample is added to the cylinder.



What is the volume of the rock sample?

- A. 0.5 cm^3
- B. 0.6 cm^3
- C. 1.2 cm^3
- D. 1.7 cm^3

26. Only about 10 percent of the energy given off by standard incandescent bulbs is visible light. Most of the light given off by fluorescent bulbs is visible light. What can be inferred from this example?
- A. Incandescent bulbs produce more kinetic energy than fluorescent bulbs.
 - B. Incandescent bulbs transform more energy into heat than fluorescent bulbs.
 - C. Light waves travel faster from incandescent bulbs than from fluorescent bulbs.
 - D. Light waves change into electrical energy quicker in incandescent bulbs than in fluorescent bulbs.
27. According to the current scientific model, the solar system formed out of a cloud of different gases and dust. As the cloud flattened into a disk, most of the mass accumulated in one place. Which part of the solar system formed there?
- A. Earth
 - B. Jupiter
 - C. the Milky Way
 - D. the Sun

